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ABSTRACT

This was a replicative study that was initiated with a journeyman level certification instrument for an international union, when industry monitors were observed suggesting to examinees to "go with your first response." The question arose whether this was a researched-based practice. If not, wouldn't this practice inject constant error into the data, hence bring empirical validity into question? Using one hundred randomly selected examination answer sheets, erasures were catagorized as right to wrong, wrong to right, and wrong to wrong. A chi-square analysis found a significant gain in correct over incorrect changes. This was similar to studies performed with college students. The study restates the impact of changing answers on an objective examination; suggests that any non-standardized test-taking directions could inject constant error into the test data; and that the quantitative data on changing answers that was found for college students can be generalized to a non-college, technical, industrial population. (Author)

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CHANGING ANSWERS AS A TESTING STRATEGY FOR TAKING OBJECTIVE TESTS

Paper Presented at the Annual Meeting
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by

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CHANGING ANSWERS AS A TESTING STRATEGY FOR TAKING OBJECTIVE TESTS

Abstract:

This was a replicative study that was initiated with a journeyman level certification instrument for an international union, when industry monitors were observed suggesting to examinees to "go with your first response." The question arose whether this was a researched-based practice. If not, wouldn't this practice inject constant error into the data, hence bring empirical validity into question?

Using one hundred randomly selected examination answer sheets, erasures were catagorized as right to wrong, wrong to right, and wrong to wrong. A chi-square analysis found a significant gain in correct over incorrect changes. This was similar to studies performed with college students.

The study restates the impact of changing answers on an objective examination; suggests that any non-standardized test-taking directions could inject constant error into the test data; and that the quantitative data on changing answers that was found for college students can be generalized to a non-college, technical, industrial population.

CHANGING ANSWERS AS A TESTING STRATEGY
FOR TAKING OBJECTIVE TESTS

This was a replicative study that was initiated during the validation project for the industry Mechanics Examination, a journeyman level certification instrument for an international union, when industry monitors were observed suggesting that examinees "go with your first response". The question arose whether this is a research-based practice. If not, wouldn't this practice inject constant error into the data, hence bring empirical validy into question? The enclosed technical Report is a summary of the investigation.

A review of the literature found:

1. General acceptance of the proposition-"go with first impression".
2. As a percentge of the total number, the number of changed answers was small.
3. Virtually all studies found "that when students change answers, their changes result in a net gain in points. Net gains for multiple-choice exams had gain/loss ratios ranging from 2.3/1 to 5.3/1 with a medium ratio of 2.7/1".
4. A number of questions regarding the relation of changes to achievement and aptitude were unanswered, such as: Do better students gain more than poor students?

   A. Some studies found no relationship of changing answers to verbal aptitude

   B. One study found the better and poorer students tended to make changes

5. There were no differences in net gain scores by sex.

6. All the literature data was inferred from college populations.

The value of this presentation is:

1. To restate the impact of changing answers on an objective test.

2. To suggest that any non-standardized test-taking directions could inject constant error into the test data.

3. To generalize the findings to a non-college, technical, industrial population.

PROTOTYPE MECHANICS EXAMINATION

TEST REVIEW INVESTIGATION

Instructional Development Technical Report
Number 3

March 17, 1984

National Elevator Industry Educational Program
21 Park Street
Attleboro, MA 02703

PROTOTYPE MECHANICS EXAMINATION

TEST REVIEW INVESTIGATION

Background:

An observation of a seeming disproportionate number of wrong answer changes to right answers suggested that an effect other than sampling error was being observed among the prototype Mechanics Examinations. While there are no written directions in the Examination Manual or on the Exam Monitor Procedures regarding test review, there has been occasion where it was suggested by the Monitor that the examinees should not review ("go over") their answers after the initial choices were made. This may be inferred from the examination direction:

> **Should you find a question you cannot answer, do not spend too much time on it. It is generally better to make your best guess and continue on to the next question.**

There is general support for not reviewing test answers. This practice, however, is not supported by research. A review of the research literature suggests the contrary. This investigation was initiated to ascertain any implications of changing answers for the Mechanics Examination.

Procedure:

A random sample of 100 completed Prototype Mechanics Examination booklets in storage at the Attleboro Office of N.E.I.E.P. was selected for the study. Each examination was examined for changed answers. A tally was made of changes in three categtories: right answers changed to wrong answers, wrong

answers changed to right answers, and wrong answers changed to other wrong answers. Also, the weighted final score was recorded (See Table 1).

Using a Texas Instrument TI-55 Calculator, the mean and standard deviation of each category was computed (see Table 2). Using the regression analysis program, Pearson Product Moment Correlations were calculated between final score, total change, right to wrong changes and wrong to right changes (See Table 3).

Using the total number of changes divided by 3 as the best estimate for an expected frequency and the sum of the tallies for the observed frequencies, a chi-square analysis was performed (see Table 4).

Findings:

Table 1

TALLY OF QUESTION CHANGES

Sample Mumber	Exam Score	Right to Wrong	Wrong to Right	Wrong to Wrong	Total Changes
1	86	2	7	3	12
2	75	3	3	0	6
3	84	1	5	1	7
4	81	1	4	5	10
5	75	4	6	2	12
6	74	3	8	1	12
7	76	0	4	3	7
8	77	3	8	4	15
9	79	1	10	4	15
10	80	1	1	3	5
11	74	1	2	1	4
12	74	2	13	11	26
13	77	2	10	2	14
14	76	0	1	0	1
15	77	1	4	2	7
16	67	1	1	0	2

Table 1 Cont.

TALLY OF QUESTION CHANGES

Sample Mumber	Exam Score	Right to Wrong	Wrong to Right	Wrong to Wrong	Total Changes
17	64	3	3	2	8
18	76	0	5	1	6
19	84	0	4	1	5
20	79	2	3	3	6
21	80	1	2	2	5
22	83	0	4	0	4
23	84	1	6	3	10
24	85	1	13	6	20
25	85	1	3	2	6
26	86	0	5	3	8
27	88	1	1	0	2
28	88	1	1	0	2
29	82	0	8	1	9
30	83	1	4	0	5
31	79	0	6	2	8
32	65	0	2	2	4
33	52	0	3	1	4
34	63	0	7	11	18
35	64	0	6	3	9
36	62	0	4	2	6
37	65	0	3	0	3
38	67	0	2	1	3
39	65	4	5	4	13
40	67	0	1	2	3
41	61	1	9	0	10
42	89	1	6	1	8
43	67	0	2	0	2
44	61	1	1	1	3
45	78	1	5	3	9
46	74	3	4	2	9
47	77	1	3	0	4
48	77	1	6	4	11
49	79	0	3	1	4
50	77	3	6	0	9
51	78	2	0	0	2
52	78	3	3	1	7
53	81	3	2	0	5
54	85	1	2	1	4
55	92	1	1	0	2
56	76	8	18	9	35
57	84	2	5	2	9
58	80	1	7	4	12

Table 1 Cont.

TALLY OF QUESTION CHANGES

Sample Mumber	Exam Score	Right to Wrong	Wrong to Right	Wrong to Wrong	Total Changes
59	79	2	11	5	18
60	85	1	1	1	3
61	84	1	5	0	6
62	75	0	4	0	4
63	58	1	1	0	2
64	83	1	4	1	6
65	78	5	3	3	11
66	70	4	8	7	19
67	83	2	3	1	6
68	84	4	1	1	6
69	85	0	9	2	11
70	85	0	2	2	4
71	84	4	7	3	14
72	81	3	5	2	10
73	80	1	5	1	7
74	77	0	1	0	1
75	79	0	3	4	7
76	76	2	3	5	10
77	76	2	10	3	15
78	87	2	10	3	15
79	85	1	3	2	6
80	86	0	2	0	2
81	84	1	2	0	3
82	77	6	11	9	26
83	78	1	3	0	4
84	80	3	8	1	12
85	87	0	0	0	0
86	79	4	16	10	30
87	44	0	4	2	6
88	61	2	2	0	4
89	56	6	9	4	19
90	86	0	9	3	12
91	90	2	12	1	15
92	84	4	8	3	15
93	93	0	9	1	10
94	91	2	16	1	19
95	91	0	4	0	4
96	88	1	4	0	5
97	87	3	6	1	10
98	65	1	1	0	2
99	55	0	1	0	1
100	86	0	4	0	4

Table 2

MEASURES OF CENTRAL TENDENCY

	Right to Wrong	Wrong to Right	Wrong to Wrong	Totals
Mean	1.45	4.91	2.00	8.36
Std. Dev.	1.57	3.66	2.41	6.41
Maximum	8	18	11	55
Minimum	0	0	0	0

Table 3

SUMMARY OF CORRELATION

	Exam Score	Right to Wrong	Wrong to Right	Total Changes
Exam Score	--	-.07	.17	.05
Right to wrong		--	.43	.65
Wrong to right			--	.86
Total Changes				--

Table 4

CHI SQUARE ANALYSIS

	Right to Wrong	Wrong to Right	Wrong to Wrong
Observed frequencies	145	491	200
Expected frequencies	278.67	278.67	278.67

$X^2 = 248.12$, d.f. = 2, p .001

Summary and Conclusions:

It appears that an effect other than sampling error is contributing to the larger number of answers being changed from wrong answers to correct answers. Several hypotheses can be proferred to explain this effect. One possible rationale might be that learning is occuring during the taking of the test. The examinee may, by virture of his involvement in applying, analyzing and synthesizing subsequent related material, be learning appropriate concepts and processes that are applicable to correcting previous questions. Another plausible rationale is that certain key words and concepts are being presented in subsequent questions that clarify or provide recall for previous questions.

Given time for test review, the average examinee has a gain/loss ratio of 3.39:1, correct over incorrect changes. This is in keeping with existing research. There seems to be no strong relationship between the number of corrections and the raw score. It could be inferred that reviewing questions could benefit examinees at all levels of competence.

Assuming the next form of the examination will incorporate many of the questions that appeared on the prototype form, it may not be necessary to replicate this study. It is recommended, however, that the relevant findings be incorporated in the directions for the examinee in the Mechanics Examination Instructions; and be made known generally through the Conduit and personal contacts.

Bibliography

Mueller, Daniel and Virginia Wasser. "Implications of Changing Answers on Objective Test Items", Journal of Educational Measurement, 14:1, Spring, 1977.